

Claims

- [c1] 1. A superconducting magnet assembly comprising:
a vacuum chamber having a wall;
a magnet cartridge; and
a single support member extending from a wall of said vacuum chamber to said magnet cartridge, said single support member suspending said magnet cartridge within said vacuum chamber.
- [c2] 2. The superconducting magnet assembly of claim 1, wherein said single support member includes:
a support tube; and
a joint attached to an end of said support tube, said joint being attached to said wall of said outer vacuum chamber, said joint providing at least one degree of freedom to said support tube relative to said wall.
- [c3] 3. The superconducting magnet assembly of claim 2, wherein said joint includes first, second, and third disks, said first disk is coupled to said second disk by a first beam extending along at least a portion of a diameter of said first disk, and said second disk is coupled to said third disk by a beam extending along at least a portion of a diameter of said second disk.

- [c4] 4. The superconducting magnet assembly of claim 3, wherein said first disk includes first wedges extending therefrom along either side of said first beam, said first wedges are received within first recesses formed in said second disk, and said second disk includes second wedges extending therefrom along either side of said second beam, said second wedges are received within second recesses formed in said second disk.
- [c5] 5. The superconducting magnet assembly of claim 4, wherein said joint is machined from a solid cylinder of material.
- [c6] 6. The superconducting magnet assembly of claim 1, wherein said single support member includes:
a support tube; and
a joint attached to an end of said support tube, said joint being attached to said magnet cartridge, said joint providing at least one degree of freedom to said support tube relative to said magnet cartridge.
- [c7] 7. The superconducting magnet assembly of claim 6, wherein said joint includes first, second, and third disks, said first disk is coupled to said second disk by a first beam extending along at least a portion of a diameter of said first disk, and said second disk is coupled to said

third disk by a beam extending along at least a portion of a diameter of said second disk.

- [c8] 8. The superconducting magnet assembly of claim 7, wherein said first disk includes first wedges extending therefrom along either side of said first beam, said first wedges are received within first recesses formed in said second disk, and said second disk includes second wedges extending therefrom along either side of said second beam, said second wedges are received within second recesses formed in said second disk.
- [c9] 9. The superconducting magnet assembly of claim 8, wherein said joint is machined from a solid cylinder of material.
- [c10] 10. The superconducting magnet assembly of claim 1, wherein said single support member includes:
a support tube; and
a baffle disposed within said support tube.
- [c11] 11. A support member for suspending a magnet cartridge within an outer vacuum chamber in a superconducting magnet assembly, said support member comprising:
a support tube; and
a joint attached to an end of said support tube, said joint

being attached to said wall of said outer vacuum chamber, said joint providing at least one degree of freedom to said support tube relative to said wall.

[c12] 12. The superconducting magnet assembly of claim 11, wherein said joint includes first, second, and third disks, said first disk is coupled to said second disk by a first beam extending along at least a portion of a diameter of said first disk, and said second disk is coupled to said third disk by a beam extending along at least a portion of a diameter of said second disk.

[c13] 13. The superconducting magnet assembly of claim 11, wherein said first disk includes first wedges extending therefrom along either side of said first beam, said first wedges are received within first recesses formed in said second disk, and said second disk includes second wedges extending therefrom along either side of said second beam, said second wedges are received within second recesses formed in said second disk.

[c14] 14. The superconducting magnet assembly of claim 13, wherein said joint is machined from a solid cylinder of material.

[c15] 15. The superconducting magnet assembly of claim 11, wherein said single support member includes:

a support tube; and

a joint attached to an end of said support tube, said joint being attached to said magnet cartridge, said joint providing at least one degree of freedom to said support tube relative to said magnet cartridge.

[c16] 16. The superconducting magnet assembly of claim 15, wherein said joint includes first, second, and third disks, said first disk is coupled to said second disk by a first beam extending along at least a portion of a diameter of said first disk, and said second disk is coupled to said third disk by a beam extending along at least a portion of a diameter of said second disk.

[c17] 17. The superconducting magnet assembly of claim 16, wherein said first disk includes first wedges extending therefrom along either side of said first beam, said first wedges are received within first recesses formed in said second disk, and said second disk includes second wedges extending therefrom along either side of said second beam, said second wedges are received within second recesses formed in said second disk.

[c18] 18. The superconducting magnet assembly of claim 17, wherein said joint is machined from a solid cylinder of material.

[c19] 19. The superconducting magnet assembly of claim 11, wherein said single support member includes:
a support tube; and
a baffle disposed within said support tube.

[c20] 20. A superconducting magnet assembly comprising:
a vacuum chamber having a wall;
a magnet cartridge; and
a single support member extending from said wall of said vacuum chamber to said magnet cartridge, said single support member suspending said magnet cartridge within said vacuum chamber, said single support member includes:
a support tube,
a first joint attached to an end of said support tube, said first joint being attached to a wall of said outer vacuum chamber, said first joint providing at least one degree of freedom to said support tube relative to said wall, and
a second joint attached to an opposite end of said support tube, said second joint being attached to said magnet cartridge, said second joint providing at least one degree of freedom to said support tube relative to said magnet cartridge.

[c21] 21. A superconducting magnet assembly comprising:
a vacuum chamber having a wall;
a magnet cartridge; and

a single support member extending from a wall of said vacuum chamber to said magnet cartridge, said single support member suspending said magnet cartridge within said vacuum chamber, said single support member includes:

a support tube,

a first means for providing at least one degree of freedom to said support tube relative to said wall, and

a second means for providing at least one degree of freedom to said support tube relative to said magnet cartridge.

[c22] 22. The superconducting magnet assembly of claim 21, wherein said first means is coupled to said support tube by a first tube coupling means, and said second means is coupled to said support tube by a second tube coupling means.

[c23] 23. The superconducting magnet assembly of claim 22, wherein said first and second tube coupling means each include a plug disposed within said support tube and a collar disposed around a periphery of said support tube.

[c24] 24. The superconducting magnet assembly of claim 21, wherein said first and second means each includes first, second, and third disks, said first disk is coupled to said second disk by a first beam extending along at least a

portion of a diameter of said first disk, and said second disk is coupled to said third disk by a beam extending along at least a portion of a diameter of said second disk.

- [c25] 25. A method of suspending a magnet cartridge within an outer vacuum chamber in a superconducting magnet assembly, the method comprising:
securing the superconducting magnet assembly to a single support member, said single support member including at least one joint disposed on a support rod.